AMENDMENTS TO THE CLAIMS

(IN FORMAT COMPLIANT WITH THE REVISED 37 CFR 1.121)

Please cancel claim 23 without prejudice. Please add new claims 27-33.

---

1. (CURRENTLY AMENDED) A method for encoding K>1 ~~sequentially presented video~~ pictures of video, comprising the steps of:

(a) dividing each of ~~the~~ said K pictures into an m>1 row ~~x~~ by an n>1 column array of ~~non-overlapping~~ coding units ~~of equal sizes, each coding unit occupying a respective coding unit position in the picture from which it was divided,~~; and

(b) selecting ~~an arbitrary~~ a pseudo random pattern of said coding units for refreshing during each of ~~the~~ said K pictures, each of said pseudo random patterns ~~pattern~~ selected during any given one of ~~the~~ said K pictures including a sequence of one or more of said coding units ~~of the array~~,

wherein ~~the pixels of~~ (i) each of said coding units ~~unit~~ selected for refreshing during a k^{th} picture of said K pictures occupy different ~~pixel~~ positions than each of said coding units ~~unit~~ selected for refreshing during a preceding one of ~~the~~ a 1^{st} to a $(k-1)^{th}$ pictures of ~~the~~ said K pictures~~,~~ and ~~wherein~~ (ii) each ~~pixel position of a moving picture image formed~~ of said positions

from ~~the~~ said K pictures is selected for refreshing once over ~~the sequence of~~ said K pictures.

2. (CURRENTLY AMENDED) The method of claim 1, wherein ~~the~~ said coding units are macroblocks and ~~the coding unit~~ said positions are macroblock positions.

3. (CURRENTLY AMENDED) The method of claim 1 ~~wherein the coding unit positions are sequentially ordered in a row-column direction, a coding unit position at one end of one row of the array, immediately preceding a coding unit position at the opposite end of an adjacent row, in the sequential ordering, the method,~~ further comprising the ~~steps~~ step of:

~~(c)~~ during at least one of ~~the~~ said K pictures, selecting ~~plural~~ a plurality of said sequences ~~of coding units~~ of a fixed length q~~, the first coding unit of each of the selected~~ with said sequences being offset from ~~the first coding unit of the next selected sequence~~ each other by q•K ~~coding unit~~ of said positions.

4. (CURRENTLY AMENDED) The method of claim ~~3~~ 1, further comprising the steps of:

~~(d)~~ initializing a length counter to a first constant and a frequency counter to a second constant~~,~~; and

~~(e)~~ during each of ~~the~~ said K pictures:

~~(f)~~ if ~~the~~ said length counter is equal to a fixed length q then~~: (g)~~ (i) setting ~~the~~ said length counter to ~~the~~ said first constant, ~~(h)~~ (ii) resetting ~~the~~ said frequency counter to ~~the~~ said second constant minus one~~,~~ if ~~the~~ said frequency counter equals K~~,~~ and ~~(i)~~ (iii) incrementing ~~the~~ said frequency counter~~,~~; ~~(j)~~ counting a next to-be-processed coding unit of said coding units in sequential order and incrementing ~~the~~ said length counter for ~~the~~ said next to-be-processed coding unit~~,~~; and ~~(k)~~ selecting ~~the~~ said next to-be-processed coding unit for refreshing if ~~the~~ said frequency counter is ~~the~~ said second constant.

5. (CURRENTLY AMENDED) The method of claim ~~3~~ 1, wherein ~~q>1,~~ a fixed length q for a plurality of said sequences is (i) an exact divisor of ~~the~~ a number of said coding units in each ~~picture and q is~~ of said K pictures, (ii) less than ~~the~~ said number of said coding units in each of said K pictures ~~picture~~ and (iii) greater than one.

6. (ORIGINAL) The method of claim 5 wherein K is free of a common divisor with m•n/q, other than 1.

7. (CURRENTLY AMENDED) The method of claim 4, wherein ~~the~~ said K pictures are a plurality of field pictures of a

plurality of interlaced frames, ~~wherein~~ each of said coding units ~~unit~~ is an interlaced field coding unit~~,~~ and ~~wherein spatially interleaved~~ said interlaced field coding units from a single given frame of said interlaced frames are refreshed during sequential pictures k~~,~~ and k+1 of ~~the sequence of~~ said K pictures, the method further comprising the ~~step of,~~

~~performing steps (e)-(k) for each field of each frame, and for each field~~ steps of:

~~(l)~~ if a ~~the~~ last of said coding units ~~unit~~ at ~~the~~ a last of said field pictures of one of said interlaced frames ~~the frame~~ is reached, setting a frame counter equal to ~~the~~ said frequency counter~~,~~; and

~~(m)~~ if ~~the~~ said last coding unit ~~of a field other than the last field of the frame~~ is reached, setting ~~the~~ said frequency counter equal to ~~the~~ said frame counter.

8. (CURRENTLY AMENDED) The method of claim 1, wherein each of ~~the~~ said K pictures is a field picture of an interlaced frame, each of said coding units ~~unit~~ is an interlaced field coding unit and ~~wherein spatially interleaved~~ said interlaced field coding units from a single given frame of said interlaced frames are refreshed during sequential pictures k~~,~~ and k+1 of ~~the sequence of~~ said K pictures.

9. (CURRENTLY AMENDED) The method of claim 1, wherein ~~the pattern of sequences is~~ said pseudo random patterns are decorrelated ~~from picture to picture~~ among said K pictures.

10. (CURRENTLY AMENDED) The method of claim 9, wherein ~~the~~ a starting and an ending coding unit of said coding units ~~of each sequence~~ in each of a plurality of said sequences within each of said K pictures are located in ~~coding unit positions of~~ different columns of ~~the~~ said array over successive ones of ~~the~~ said K pictures.

11. (CURRENTLY AMENDED) The method of claim 9, wherein ~~each sequence~~ (i) at least a first one of said sequences starts at a ~~coding unit~~ first position of said positions which is offset from ~~the~~ a leftmost ~~coding unit~~ position of said positions in a first ~~the~~ row of ~~the~~ said array containing ~~the~~ a beginning of ~~the~~ said first sequence by one or more ~~coding unit~~ of said positions~~,~~ and (ii) a second one of said sequences ends at a ~~coding unit~~ second position of said positions which is offset from ~~the~~ a rightmost ~~coding unit~~ position of said positions in a second ~~the~~ row of ~~the~~ said array containing ~~the~~ an end of ~~the~~ said second sequence by one or more ~~coding unit~~ of said positions~~, or both~~.

12. (CURRENTLY AMENDED) An apparatus ~~for encoding K>1 video frames~~ comprising:

~~(a)~~ a source for supplying ~~a sequence of~~ K>1 pictures of video ~~frames~~, each ~~of which is~~ divided into an m>1 row ~~x~~ by an n>1 column array of ~~non-overlapping~~ coding units ~~of equal sizes, each coding unit occupying a respective coding unit position in the picture from which it was divided,~~; and

~~(b)~~ an inter/intra decision circuit for selecting ~~an arbitrary,~~ a pseudo random pattern of said coding units for refreshing during each of ~~the~~ said K pictures, each of said pseudo random patterns ~~pattern~~ selected during any given one of ~~the~~ said K pictures including a sequence of one or more of said coding units ~~of the array~~,

wherein ~~the pixels of~~ (i) each of said coding units ~~unit~~ selected for refreshing during a k^{th} picture of said K pictures occupy different ~~pixel~~ positions than each of said coding units ~~unit~~ selected for refreshing during a preceding one of ~~the~~ a 1^{st} to a $(k-1)^{th}$ pictures of ~~the~~ said K pictures~~,~~ and ~~wherein~~ (ii) each ~~pixel position of a moving picture image formed~~ of said positions from ~~the~~ said K pictures is selected for refreshing once over ~~the sequence of~~ said K pictures.

13. (CURRENTLY AMENDED) The apparatus of claim 12, wherein ~~the~~ said coding units are macroblocks and ~~the coding unit~~ said positions are macroblock positions.

14. (CURRENTLY AMENDED) The apparatus of claim 12, wherein ~~the coding unit positions are sequentially ordered in a row-column direction, a coding unit position at one end of one row of the array, immediately preceding a coding unit position at the opposite end of an adjacent row, in the sequential ordering,~~ ~~wherein the~~ said inter/intra decision circuit is also for, during at least one of ~~the~~ said K pictures ~~frames~~, selecting ~~plural~~ a plurality of said sequences ~~of coding units~~ of a fixed length q~~,~~ ~~the first coding unit of each of the selected~~ with said sequences being spaced from ~~the first coding unit of the next selected sequence~~ each other by q•K ~~coding unit~~ of said positions.

15. (CURRENTLY AMENDED) The apparatus of claim ~~14~~ 12, wherein the inter/intra decision circuit is also for:

initializing a length counter to a first constant and a frequency counter to a second constant~~,~~; and

during each of ~~the~~ said K frames:

if ~~the~~ said length counter is equal to q then~~,~~ (i) setting ~~the~~ said length counter to ~~the~~ said first constant, (ii) resetting the frequency counter to the second constant minus one,

if the frequency counter equals K~~,~~ and (iii) incrementing ~~the~~ said frequency counter~~,~~;

counting a next to-be-processed coding unit of said coding units in sequential order and incrementing ~~the~~ said length counter for ~~the~~ said next to-be-processed coding unit~~,~~; and~~,~~

selecting ~~the~~ said next to-be-processed coding unit for refreshing if ~~the~~ said frequency counter is ~~the~~ said second constant.

16. (CURRENTLY AMENDED) The apparatus of claim ~~14~~ 12, wherein ~~q>1,~~ a fixed length q for a plurality of said sequences is (i) an exact divisor of ~~the~~ a number of said coding units in each ~~picture and q is~~ of said K pictures, (ii) less than ~~the~~ said number of said coding units in ~~a picture~~ each of said K pictures and (iii) greater than one.

17. (ORIGINAL) The apparatus of claim 16 wherein K is free of a common divisor with m•n/q, other than 1.

18. (CURRENTLY AMENDED) The apparatus of claim ~~14~~ 15, wherein each of ~~the~~ said K pictures is a field picture of an interlaced frame, each of said coding units is an interlaced field coding unit and ~~wherein spatially interleaved~~ said interlaced field coding units from a single given frame of said interlaced frames

are refreshed during sequential pictures k~~,~~ and k+1 of ~~the sequence of~~ said K pictures, wherein ~~the~~ said inter/intra decision circuit is also for:

~~for each field,~~ if a ~~the~~ last of said coding units ~~unit~~ at a ~~the~~ last of said field pictures of one of said interlaced frames ~~the frame~~ is reached, setting a frame counter equal to ~~the~~ said frequency counter~~,~~; and

if ~~the~~ said last coding unit ~~of a field other than the last field of the frame~~ is reached, setting ~~the~~ said frequency counter equal to ~~the~~ said frame counter.

19. (CURRENTLY AMENDED) The apparatus of claim 12, wherein each of ~~the~~ said K pictures is a field picture of an interlaced frame, each of said coding units ~~unit~~ is an interlaced field coding unit and ~~wherein spatially interleaved~~ said interlaced field coding units from a single given frame of said interlaced frames are refreshed during sequential pictures k~~,~~ and k+1 of ~~the sequence of~~ said K pictures.

20. (CURRENTLY AMENDED) The apparatus of claim 12, wherein ~~the pattern of sequences is~~ said pseudo random patterns are decorrelated ~~from picture to picture~~ among said K pictures.

21. (CURRENTLY AMENDED) The apparatus of claim 20, wherein ~~the~~ a starting and an ending coding unit of said coding units ~~of each sequence~~ in each of a plurality of said sequences within each of said K pictures are located in ~~coding unit positions of~~ different columns of ~~the~~ said array over successive ones of ~~the~~ said K pictures.

22. (CURRENTLY AMENDED) The apparatus of claim 20, wherein ~~each sequence~~ (i) at least a first one of said sequences starts at a ~~coding unit~~ first position of said positions which is offset from ~~the~~ a leftmost ~~coding unit~~ position of said positions in a first ~~the~~ row of ~~the~~ said array containing ~~the~~ a beginning of ~~the~~ said first sequence by one or more ~~coding unit~~ of said positions~~,~~ and (ii) a second one of said sequences ends at a ~~coding unit~~ second position of said positions which is offset from ~~the~~ a rightmost ~~coding unit~~ position of said positions in a second ~~the~~ row of ~~the~~ said array containing ~~the~~ an end of ~~the~~ said second sequence by one or more ~~coding unit~~ of said positions~~, or both~~.

23. (CANCELED)

24. (CURRENTLY AMENDED) A storage medium for storing ~~an encoded~~ a video signal comprising ~~a sequence of~~ K>1 pictures ~~encoded frames,~~ each ~~of the frames~~ being divided into an m>1 ~~x~~ by

an n>1 array of ~~non-overlapping~~ coding units ~~of equal sizes, each coding unit occupying a respective coding unit position in the picture from which it was divided~~, each of ~~the~~ said K pictures including ~~an arbitrary~~ a pseudo random pattern of ~~refreshed~~ said coding units being refreshed, ~~the refreshed coding units being spatially only encoded,~~ each of said pseudo random patterns ~~pattern of coding units selected for refreshing~~ during any given one of ~~the~~ said K pictures including a sequence of one or more of said coding units ~~of the array~~, wherein ~~the pixels of~~ (i) each of said coding units ~~unit~~ selected for refreshing during a k^{th} picture of said K pictures occupy different ~~pixel~~ positions than each of said coding units ~~unit~~ selected for refreshing during a preceding one of ~~the~~ a 1^{st} to a $(k-1)^{th}$ pictures of ~~the~~ said K pictures~~,~~ and ~~wherein~~ (ii) each ~~pixel position of a moving picture image formed~~ of said positions from ~~the~~ said K pictures is selected for refreshing once over ~~the sequence of~~ said K pictures.

25. (CURRENTLY AMENDED) An apparatus ~~for decoding a video signal containing a sequence of K>1 encoded frames, each of the frames being divided into an m>1 x n>1 array of non-overlapping coding units of equal sizes, each coding unit occupying a respective coding unit position in the picture from which it was divided, each of the K pictures including an arbitrary pseudo random pattern of refreshed coding units, the refreshed coding~~

~~units being spatially only encoded, each pattern of coding units selected for refreshing during any given one of the K pictures including a sequence of one or more coding units of the array, wherein the pixels of each coding unit selected for refreshing during a kth picture occupy different pixel positions than each coding unit selected for refreshing during a preceding one of the 1st to (k-1)th pictures of the K pictures, and wherein each pixel position of a moving picture image formed from the K pictures is selected for refreshing once over the sequence of K pictures, the apparatus~~ comprising:

(a) a ~~spatial~~ decoder for ~~spatially decoding each coding unit,~~ decoding a plurality of coding units from a picture of a video signal, said coding units being partitioned among a plurality of groups in said picture according to a pattern, each of said groups comprising a plurality of sequences, each of said sequences comprises at least one of said coding units, wherein a first of said groups uses a first type of prediction and a second of said groups uses a second type of prediction different than said first type of prediction;

(b) a motion compensator~~,~~ for adding said coding units from said second group ~~outputted from the spatial decoder, other than the coding units which were spatially only encoded,~~ to a plurality of predictions derived from at least one of a plurality of ~~reconstructed~~ reference pictures~~,~~ for a motion compensation; and

(c) a frame memory for storing ~~the reconstructed~~ a new reference picture of said reference pictures formed from said coding units after said motion compensation ~~decoded by the spatial decoder and coding units decoded by the motion compensator, wherein over the K pictures, a coding unit in each coding unit position of a moving picture image is reconstructed from a coding unit which is designated for refreshing, spatially only encoded and decoded only by the spatial decoder without data from another coding unit or picture~~.

26. (CURRENTLY AMENDED) A method for decoding a video signal ~~containing a sequence of K>1 encoded frames, each of the frames being divided into an m>1 x n>1 array of non-overlapping coding units of equal sizes, each coding unit occupying a respective coding unit position in the picture from which it was divided, each of the K pictures including an arbitrary, pseudo random pattern of refreshed coding units, the refreshed coding units being spatially only encoded, each pattern of coding units selected for refreshing during any given one of the K pictures including a sequence of one or more coding units of the array, wherein the pixels of each coding unit selected for refreshing during a k^{th} picture occupy different pixel positions than each coding unit selected for refreshing during a preceding one of the 1^{st} to $(k-1)^{th}$ pictures of the K pictures, and wherein each pixel~~

~~position of a moving picture image formed from the K pictures is selected for refreshing once over the sequence of K pictures, the method~~ comprising the steps of:

(a) ~~spatially~~ decoding ~~each coding unit,~~ a plurality of coding units from a picture of said video signal, said coding units being partitioned among a plurality of groups in said picture according to a pattern, each of said groups comprising a plurality of sequences, each of said sequences comprises at least one of said coding units, wherein a first of said groups uses a first type of prediction and a second of said groups uses a second type of prediction different than said first type of prediction;

(b) adding said coding units ~~produced in step (a), other than the coding units which were spatially only encoded,~~ from said second group to a plurality of predictions derived from at least one of a plurality of ~~reconstructed~~ reference pictures~~,~~ stored for a motion compensation; and

(c) forming ~~the reconstructed~~ a new reference picture of said reference pictures from ~~spatially only decoded~~ said coding units after said motion compensation~~, and spatially decoded coding units added to predictions, wherein over the K pictures, a coding unit in each coding unit position of a moving picture image is reconstructed from a coding unit designated for refreshing, spatially only encoded and only spatially decoded without data from another coding unit or picture~~.

27. (NEW) The method according to claim 26, wherein said pattern identifies each of said groups by a unique number.

28. (NEW) The method according to claim 26, wherein each of said coding units in said new reference picture comprise a macroblock.

29. (NEW) The method according to claim 26, wherein over a plurality of said pictures, each of a plurality of positions for said coding units are forced refreshed only once using intra prediction.

30. (NEW) The apparatus according to claim 25, wherein said pattern identified each of said groups by a unique number.

31. (NEW) The apparatus according to claim 25, wherein each of said coding units in said new reference picture comprise a macroblock.

32. (NEW) The apparatus according to claim 25, wherein over a plurality of said pictures, each of a plurality of positions for said coding units are forced refreshed only once using intra prediction.

33. (NEW) An apparatus comprising:

means for decoding a plurality of coding units from a picture of a video signal, said coding units being partitioned among a plurality of groups in said picture according to a pattern, each of said groups comprising a plurality of sequences, each of said sequences comprises at least one of said coding units, wherein a first of said groups uses a first type of prediction and a second of said groups uses a second type of prediction different than said first type of prediction;

means for adding said coding units from said second group to a plurality of predictions derived from at least one of a plurality of reference pictures stored for a motion compensation; and

means for forming a new reference picture of said reference pictures from said coding units after said motion compensation.